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09/578,108	05/24/2000	David Kazmer		4768

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EXAMINER
AMINI, JAVID A

ART UNIT	PAPER NUMBER
2672	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/578,108	KAZMER ET AL.	
	Examiner	Art Unit	
	Javid A Amini	2672	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-39 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-39 is/are rejected.

7)☒ Claim(s) 1-39 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3, 10
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

Response to Arguments

Applicant's arguments filed December 20, 2002 have been fully considered but they are not persuasive.

Amended claim:

Claim 33 (amended): [The computer-implemented display system of claim 6 wherein said first Performance attribute is a random variable and said specification-interface enables a user to specify a probability distribution associated with said first performance attribute.]. The computer-readable medium of claim 27 wherein said software further comprises instructions for assigning a weight to said first performance attribute, thereby indicating an importance of said selected performance attribute relative to said second performance attribute.

Amended specification:

Page 1, line 7: Added the following paragraph above the paragraph labeled (field of invention):
FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT
The U.S. Government may have certain right in this invention pursuant to NSF Grant No. NCR 95-08274 awarded by the National Science Foundation.
Page 2, line 12: The computer-implemented display also includes a design interface [though] through which the designer interactively manipulates values of the design variables so as to control the performance attributes. Because of its intuitive nature, the design interface preferably includes an adjustable slider or scroll box in which movement of the scroll box or slider changes the value of the design variable. Alternatively, or in addition to the adjustable slider or scroll box, the design interface can include a text box or field into which the designer can enter a numerical value for the design variable. The text box or field is particularly useful when the value of a design variable needs to be changed by an amount that would require infinitesimal motion of the slider.
Page 5, line 6: Each well-defined design objective is one performance attribute. The set of performance attributes, together with the expected satisfaction limits constitutes a specification. Denoting the i^{th} performance attribute as y_i, a typical specification can be expressed as $LSL_i \preceq y_i \preceq USL_i$ where LSL_i and USL_i denote the lower and upper specification limits for performance attribute y_i. Without loss of generality, a one-sided specification can be formed by substituting $-\infty$ or $+\infty$ for the unspecified limits.
Page 5, line 12: Suppose $y_i = f_i(X)$, where X is the design vector, $X = \{x_1, x_2, ..., x_j, ..., x_n\}$ and $LCL_j \preceq x_j \preceq UCL_j$. By holding design parameters other than x_j constant, the sensitivity $y_i = f_i(x1^c, x2^c ..., xj, ..., xn^c)$ can be plotted, as shown in FIG. 2. To ease the computational burden, the function is linearized to acquire the analytical feasible decision space and performance space. However, the method and system of the invention are equally applicable for non-linear functions.

Page 7, line 9: [The algorithm works in parallel for each viewing pane in the decision space. Because each specification hs intersects the convex decision space at most twice, m specifications cost no more than 2m intersection calculations. Therefore, it requires O(m) time to solve the local decision space for one viewing pane.] Referring now to Fig. 3, the algorithm works in parallel for each decision graph in the decision space. Because each specification hs intersects the convex decision space at most twise, m specifications cost no more than 2m intersection calculations, Therefore, it requires O(m) time to solve the feasible region in the decision graph of FIG.7.

Page 8, line 27: [The convex property of the linear problem significantly simplifies the solution of the feasible space. Based on the convexity, the decision space and the performance space are the convex hulls of the same extreme points in two different spaces. Therefore, the first critical step is to find these extreme points. This can be done by solving the system equations composed of n design constraints. Every combination of n constraints from the specification and the parameter limits corresponds to a potential extreme point. The confirmation of this intersection point comes from the feasibility validation of the solution. Any valid intersection point of n constraints is one extreme point of the feasible design space. After all extreme points are acquired, a convex hull algorithm can be applied to each viewing-pane in the decision space and the performance space. Alternatively, the extreme points can be traced to find the facet of the feasible polytope. Each facet represents one specification or parameter limit. The linear system of equations $F.X = Y$ can be solved by LU decomposition. Given the fact that there are 2^n system equations sharing the same coefficient matrix F but different vectors Y, the LU decomposition, shown in FIG. 7, reduces the computation time. An outline of the algorithm is given as:]. The convex property of the linear problem significantly simplifies the solution of the feasible space. Based on the convexity, the decision space and the performance space are the convex hulls of the same extreme points in two different spaces. Therefore, the first critical step is to find these extreme points. This can be done by solving the system equations composed of n design constraints. Every combination of n constraints from the specification and the parameter limits corresponds to a potential extreme point. The confirmation of this intersection point comes from the feasibility validation of the solution. Any valid intersection point of n constraints is one extreme point of the feasible design space. After all extreme points are acquired, a convex hull algorithm can be applied to each decision graph in the decision space and the performance graph in the performance space. Alternatively, the extreme points can be traced to find the facet of the feasible polytope. Each facet represents one specification or parameter limit. The linear system of equations $F.X = Y$ can be solved by LU decomposition. Given the fact that there are 2^n system equations sharing the same coefficient matrix F but different vectors Y, the LU decomposition, shown in FIG. 5A, reduces the computation time.

Response to remarks on page 5 "Processor": This part of claim omits an element which applicant describes as an essential or critical feature of the invention. Is processor part of the invention?

Response to remarks on page 5 " Control Graph": The Figs. 10 and 14 are not descriptive.

Response to remarks on pages 6 and 7 " Performance and Decision Graphs": The Figs. 10 and 14 are not descriptive. There are no labeled graphs as performance/decision graphs in Figs. 10 and 14!

Response to remarks on page 8 " Design Interface": Is design interface part of graphical user interface? And what is the critical or essential feature of design interface in this invention?

Response to remarks on page 9" Random variable and probability distribution": Applicant should be able to specify and illustrate the range of variables and probability of occurrences. The connection (complete parameters: equations, relationships, data) between these methods (laws of nature) and the invention should be stated clearly.

Response to remarks on pages 9-12 concerning rejection of 35 USC 112: they are not persuasive.

Response to Double-patenting rejection on page 12: Applicant did not specify how a method can be visualized, and what are the components/elements?

Response to rejection 35 USC 103 on page 14: Applicant discloses that the reference Sugino fails to teach the limitation of multivariable, contrary Sugino illustrates in Fig. 1A number 102 the data comprises of multivariable. Applicant discloses that the reference Sugino fails to teach the limitation of "a plurality of decision graphs generated on said display using said output of said processor, at least one of said decision graphs showing a relationship between said first design variable and a second design variable" see Fig. 6 illustrates three different points on the graph that represents the relationship between variables.

Response to rejection 35 USC 103 on page 15: Daniel discloses a method to define a matrix that contains rows and columns and it is a rectangular shape (col. 10, line 65-68). Daniel discloses a method to create a unique Graphic User Interface or may be integrated with existing GUI's (col. 28, line 55-60). Daniel illustrated in Fig. 22 the outer region has limitations or boundary conditions.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3, 5-8, 11, 14-21, 24, 27-34 and 37 rejected under 35 U.S.C. 103(a) as being unpatentable over Sugino US patent 5,287,284 with filling date of 11/14/1991.

1. Claims 1, 14, 27

As per claim 1, Sugino demonstrated all the elements in Fig. 2 and 3 the data processing unit number 21 and the display device number 16. As for "a processor having an input for accepting instructions and an output for driving a visual display". Sugino demonstrated all the elements in Fig. 10 that the optimum value of the design parameter is displayed by the result display-processing unit 30 on the display device 16 together with a graph representing the design parameter change of the evaluation value obtained by the trade-off evaluation unit 28. As for "a plurality of control graphs generated on said display using said output of said processor, at least one of said control graphs illustrating an effect of a first design variable on a first performance attribute". Sugino demonstrated all the elements in Figs. 1a,b and c, that attributes from fetch data analyzed and display optimization result on display device in graphical or data formats. As for "a plurality of performance graphs generated on said display using said output of said processor, at least one of said performance graphs showing a relationship between said first performance attribute and a second performance attribute". Sugino demonstrated all the elements

in Figs. 1a,b and c, which decide design parameters, which make evaluation formula maximal from a plurality of normalized analysis results by evaluation unit28. As for "a plurality of decision graphs generated on said display using said output of said processor, at least one of said decision graphs showing a relationship between said first design variable and a second design variable". Sugino demonstrated all the elements in Fig. 1A number 102 that the parameters can be entered into system through keyboard (user keyboard). As for " a design-interface coupled to said input of said processor, said design-interface enabling a user to manipulate said first design variable to control said first performance attribute".

These steps are obvious because most of systems have processors and display, and compatibility or the common use of a database has been accomplished so as to carry out a plurality of analyses as a series of analyses, but evaluation of each analysis result is entirely left to the judgment of users.

2. Claims 2, 15, 28

Sugino demonstrated all the elements in (col. 8 line 45-50) that the optimum value of the design parameter is displayed by the result display processing unit 30 on the display device 16 together with a graph representing the design parameter change of the evaluation value obtained by the trade-off evaluation unit 28, as shown in Fig. 10.

As for "The computer-implemented display system of claim 1 wherein said design-interface is a graphical user-interface". The step is obvious because Specific analysis or analyses are conducted with a high level of accuracy (to yield accurate calculation results for an assumed model) and the analysis results are merely displayed graphically.

3. Claims 3, 16-17,29-30

Sugino illustrated in Fig. 7 to change parameters for example "weights" using the user-adjustable slider and values of design variables change in response to movement of slider.

As for "The computer-implemented display system of claim 2 wherein said graphical user-interface comprises a scroll-bar having a user-adjustable slider and a value of said first design variable changes in response to movement of said adjustable slider".

The step is obvious because in order to experience the best results out of the model analysis the programs should include tools bar to make it easier for user interface.

4. Claims 5, 18,21, 24,31,34, 37

Sugino demonstrated all the elements in Fig. 13A, 13C number 202 and122 convert and normalize analysis results approximated by polynomials probability distribution.

As for "The computer-implemented display system of claim 1 wherein said first design variable is a random variable and said design-interface enables a designer to specify a probability distribution of said first design variable". The step is obvious because in order to experience the best result, first the system will start with random or estimated variables until the user find the correct range of values from first design variable.

5. Claims 6, 19, 32

Sugino demonstrated all the elements in (Col. 6 line 44-54) that the analysis execution controller 24 changes the chip pad position as one of the design parameters (processing 110) and if the chip pad position after this change is within the change range of the chip pad position as the allowable design range of the chip pad position to be in advance inputted to the system (processing 112), the analysis program is executed once again while data other than the chip pad position data are

regarded as being the same, and the analysis result as the execution result is stored in the disc device 18 by the analysis result storage controller 26.

As for "The computer-implemented display system of claim 1 further comprising a specification interface coupled to said plurality of performance graphs, said specification interface enabling a designer to specify a range of permissible values for said first performance attribute".

The step is obvious because in order to experience the best result, first the system will start with random or estimated variables until the user find the correct range of values from first design variable that is a range of permissible values.

6. Claims 7, 20, 33

Sugino demonstrated all the elements in Fig. 7 and Fig. 1C number 302.

As for "wherein said specification interface further comprises a designer-preference interface for enabling a designer to assign a weight to said first performance attribute, thereby indicating an importance of said first performance attribute relative to said second performance attribute". The step is obvious because the second performance attribute has different values (weight coefficients) than is a first performance attribute.

7. Claim 8,

Sugino demonstrated all the elements in Fig. 13A number 202 analysis by group of analysis programs managed from items of estimates by program storage controller. Also in Fig. 13C number 122 demonstrated all the elements that to convert and normalize analysis results approximated by polynomials probability distribution.

As for "The computer-implemented display system of claim 6 wherein said first performance attribute is a random variable and said specification-interface enables a user to specify a probability distribution associated with said first performance attribute". The step is obvious because in order to experience the best result, first the system will start with random or estimated variables until the user find the correct range of values from first design variable.

8. Claim 11,

Sugino illustrated in Fig. 5 and 6 that control graph display indicates of allowable values of the design variable. As for "The computer-implemented display system of claim 1 wherein said at least one control graph displays an indication of allowable values of said first design variable". The step is obvious because in order to experience the best result, first the system will start with random or estimated variables until the user find the correct range of values from first design variable that is a range of permissible values.

Claims 4, 9-10, 12-13, 22-23, 25-26, 35-36 and 38-39 rejected under 35 U.S.C. 103(a) as being unpatentable over Sugino US patent 5,287,284, and further in view of Daniel US patent 6,289,299 B1.

9. Claim 4,

Sugino illustrated in Fig. 1A that data can be enter into system from designated areas. It is noted that Sugino dose not explicitly disclose a field area, however, this is known in the art as taught by Daniel. Daniel discloses a method to create a unique Graphic User Interface or may be integrated with existing GUI's (col. 28, line 55-60). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Daniel

into Sugino because Sugino discloses a graphical method to display the out come of the system and Daniel discloses a method to create a unique Graphic User Interface that is a field area for entering data by users.

10. Claims 9, 10, 22-23, 35-36

Sugino demonstrated all the elements in Fig. 8 that plurality of control graphs is disposed in an array. It is noted that Sugino dose not explicitly specify the array is a rectangular array of rows and columns, however, this is known in the art as taught by Daniel. Daniel discloses a method to define a matrix that contains rows and columns and it is a rectangular shape (col. 10, line 65-68).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Daniel into Sugino because Sugino discloses a graphical method to display the out come of array data and Daniel discloses a rectangular shape with rows and columns that indicates variables in column and attributes in row.

11. Claims 12, 13, 25-26, 38-39

Sugino demonstrated all the elements in Fig. 7 and 8 that performance graph shows a region of permissible values for numbers of performance attributes. It is noted that Sugino dose not explicitly specify the outer boundaries, however, this is known in the art as taught by Daniel. Daniel illustrated in Fig. 22 the outer region has limitations or boundary conditions.

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Daniel into Sugino because Sugino discloses a graphical method to display the characteristics of the model or system and Daniel discloses a method of implementing boundary conditions for the model or the design.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

1. Claims 1-39 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

2. Claim 1 recites the limitation " a processor having an input for accepting instructions and an output for driving a visual display" in second paragraph of claim 1. There is insufficient antecedent basis for this limitation in the claim, the specification dose not illustrate a processor. All processors have inputs and outputs and all are accepting instructions for driving the outputs (Display, printers or audio), therefore, the word "a processor" is not clear whether is part of the invention or is a specialized processor.

3. Claim 1 recites the limitation "a plurality of control graphs generated on said display using said output of said processor, at least one of said control graphs illustrating an effect of a first design variable on a first performance attribute" in third paragraph of claim 1. There is insufficient antecedent basis for this limitation in the claim. Applicant dose not specify the number of control graphs that shows which one of control graphs illustrating an effect of a first design variable on a first performance attribute.

4. Claim 1 recites the limitation "a plurality of performance graphs generated on said display using said output of said processor, at least one of said performance graphs showing a relationship between said first performance attribute and a second performance attribute" in fourth paragraph of claim 1. There is insufficient antecedent basis for this limitation in the

claim. Applicant dose not specify the number of performance graphs that shows which one of performance graphs showing a relationship between first performance attribute and a second performance attribute.

5. Claim 1 recites the limitation "a plurality of decision graphs generated on said display using said output of said processor, at least one of said decision graphs showing a relationship between said first design variable and a second design variable" in fifth paragraph of claim 1. There is insufficient antecedent basis for this limitation in the claim. Applicant dose not specify the number of decision graphs that shows which one of decision graphs showing a relationship between first design variable and a second design variable.

6. Claim 1 recites the limitation " a design-interface coupled to said input of said processor, said design-interface enabling a user to manipulate said first design variable to control said first performance attribute." in sixth paragraph of claim 1. There is insufficient antecedent basis for this limitation in the claim. Applicant dose not specify, how a design interface coupled to an input of a processor. Is design interface physically connected to a specific processor or is using the same standards pathway of other existing applications (for example: Qualiparc "interface and decision builder" from ps'soft; IBM "Tivoli" and etc. see references).

7. Dependent claims 2-4 are indefinite for the same reason as given for claim 1.

8. Claim 5 recites the limitation "random variable and probability distribution" page 21 of claim 5. Applicant dose not specify, what random variables are and how a method of probability distribution involved in this invention. These claim limitations are indefinite and there is insufficient antecedent basis for these limitations in the specification.

9. Claim 6 recites the limitation "permissible values" in page 21 of claim 6. There is insufficient antecedent basis for this limitation in the specification (what is the range of permissible values.

10. Claim 7 recites the limitation "weight" in page 21 of claim 7. There is insufficient antecedent basis for this limitation in the specification.

11. Claim 8 recites the same limitation as claim 6.

12. Claim 9 recites the limitation "array" in page 21 of claim 9. There is insufficient antecedent basis for this limitation in the specification. The applicant dose not specify how the set of data items are associated (addressable) with performance attribute and a decision variable.

13. Claim 10 recites the same limitation as rejection of claim 9.

14. Claim 11 recites the limitation "allowable values" in page 21 of claim 11. There is insufficient antecedent basis for this limitation in the specification.

15. Claim 12 recites the same limitations as rejection of claims 9 and 1.

16. Claim 13 recites "Pareto Optimal" concept this term is not clear.

17. Claims 14-26 are rejected based on the same rejections of claims 1-13.

18. Claims 27-39 are rejected based on the same rejections of claims 1-13.

Double Patenting

19. Claims 14-26 objected to under 37 CFR 1.75 as being a substantial duplicate of claims 27-39. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

20. The following two independent claims 14 and 27 are covering the same contents (illustrating graphics display) with slightly different wording occurring in the preamble.

Independent claim 14 (first paragraph page 22) "A method of visualizing the effect of selected values of a plurality of design variables on a plurality of performance attributes, said method comprising:"

Independent claim 27 (first paragraph page 23) "A computer-readable medium having encoded thereon software for visualizing the effect of selected values of a plurality of design variables on a plurality of performance attributes, said software comprising instructions for:"

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Javid A Amini whose telephone number is 703-605-4248. The examiner can normally be reached on 8-4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Razavi can be reached on 703-305-4713. The fax phone numbers for the organization where this application or proceeding is assigned are 703-746-8705 for regular communications and 703-746-8705 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-0377.

Javid A Amini
Examiner
Art Unit 2672

Javid Amini
February 25, 2003

MICHAEL RAZAVI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600